decoder including an outer decoder and an outer error correcting code of a predefined rate; and

A1 Cont.

processing soft values as reliability information at an output and an input of the soft-in/soft-out decoder, a soft output of the inner decoder being a soft input for the outer decoder, a channel reliability information output from a preceding demodulation being an input for the inner decoder.

10. (Amended) The method as recited in claim 7 wherein the inner decoder includes a maximum a-posteriori decoder and wherein the a-priori information is made available to the inner decoder as reliability values in an a-priori vector L(u), u being a bit, so that the inner decoder provides L-values for estimated symbols of an inner decoder soft value output vector L(û), an amount $|L(\hat{u}_k)|$ of the L-values indicating a reliability of a respective decision and an operational sign of the $L(\hat{u}_k)$ representing a hard decision.

A2

11. (Amended) The method as recited in claim 9 wherein the inner decoder includes a maximum a-posteriori decoder and wherein the a-priori information is made available to the inner decoder as reliability values in an a-priori vector L(u), u being a bit, so that the inner decoder provides L-values for estimated symbols of an inner decoder soft value output vector L(û), an amount $|L(\hat{u}_k)|$ of the L-values indicating a reliability of a respective decision and an operational sign of the $L(\hat{u}_k)$ representing a hard decision.

12. (Amended) The method as recited in claim 1 wherein the receiver includes a coherent receiver structure, wherein a soft input of the inner decoder includes a-priori information for systematic bits of Walsh functions of the inner code and wherein the inner decoder includes a maximum a-posteriori decoder, the maximum a-posteriori decoder calculating, starting from an input vector $L_C \cdot y$, y being a vector, having a specific reliability L_C and from an a-priori information vector L(u), u being a bit, as a decoder result, a weighted decision including reliability L-values for estimated symbols, the L-values including an extrinsic term $L_e(\hat{u}_k)$.

13. (Amended) The method as recited in claim 1 wherein the receiver includes a coherent receiver structure, wherein a soft input of the inner decoder includes a-priori information for systematic bits of Walsh functions of the inner code, and wherein the inner code includes a Hadamard code, the Hadamard code being decoded by:

adding an a-priori information vector L(u), u being a bit, for systematic bits of a Walsh function of the Hadamard code to an input vector $L_C \cdot y$, y being a vector, from a channel;

performing a fast Hadamard transformation so as to provide a fast Hadamard transform resultant vector w;

then generating exponential functions with $\frac{1}{2} \cdot w_j$ as an argument, w_j being a respective element of the vector w; and

adding, dividing and expressing logarithmically elements of a result vector z for each symbol $\hat{u}_K$ to be decoded according to the equation:

Term 1 Term 2

$$\ln\frac{\sum_{j,u_k=+1}^{N-1} z_j}{\sum_{j,u_k=-1}^{N-1} z_j} = \ln\frac{\sum_{j,u_k=+1}^{N-1} \exp(\frac{1}{2}w_j)}{\sum_{j,u_k=-1}^{N-1} \exp(\frac{1}{2}w_j)} = \ln\left(\sum_{j,u_k=+1}^{N-1} \exp(\frac{1}{2}w_j)\right) - \ln\left(\sum_{j,u_k=-1}^{N-1} \exp(\frac{1}{2}w_j)\right)$$

z_j being a respective element of the resultant vector z, j being a respective vector element index, N being a size of the Walsh functions of the inner code.

14. (Amended) The method as recited in claim 1 wherein a result of the inner decoder for a bit $\hat{u}_k$ includes a-priori information $L(u_k)$, u being a bit, about a bit to be decoded, channel information $L_C \cdot y_{sys(k)}$ about the bit to be decoded, and extrinsic information $L_e(\hat{u}_k)$, channel information and a-priori information on all other bits of a demodulator output vector y or of a transmitted Walsh function of the inner code being included in the extrinsic information $L_e(\hat{u}_k)$.

15. (Amended) The method as recited in claim 1 wherein the receiver includes an incoherent receiver structure and wherein the inner decoder includes a maximum a-posteriori decoder, the maximum a-posteriori decoder calculating, starting from a square-law-combining fast Hadamard transform resultant decision vector w and from an a-priori vector L(u), u being a bit, as a decoder result, a weighted decision including the L-values for estimated symbols, the L-values including an extrinsic term $L_e(\hat{u}_k)$.